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PLURIDIMENSIONAL ABSOLUTE CONTINUITY FOR DIFFERENTIAL FORMS AND THE STOKES FORMULA

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TABLE OF CONTENTS

INTRODUCTION

The concept of absolute continuity for functions of one real variable (defined on an open set $\Omega \subseteq \mathbf{R}$) arises very naturally in connection with the problem of characterizing the largest class of functions $u: \Omega \to \mathbf{R}$ for which there exists $f \in L^1(\Omega, \text{loc})$ such that the Leibnitz-Newton formula

$$u(b) - u(a) = \int_a^b f(x)\,dx \tag{0.1}$$

holds for any interval $[a, b] \subseteq \Omega$. Lebesgue's solution to this problem, i.e. that (0.1) holds if and only if u is (locally) absolutely continuous, establishes the most general (and natural) framework within which the Fundamental Theorem of Calculus works.